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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,322	09/20/2003	William J. Murphy	BUR9-1999-0044US2	6242

7590 09/22/2004

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EXAMINER	
WARREN, MATTHEW E	

ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/665,322	MURPHY, WILLIAM J.	
	Examiner	Art Unit	
	Matthew E Warren	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 July 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *18-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *18-25,27-29,31 and 32* is/are rejected.

7)☒ Claim(s) *26 and 30* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the Amendment filed on July 10, 2004.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 18-25, 27-29, 31, and 32 are rejected under 35 U.S.C. 102(e) as being anticipated by Li (US 6,136,690).

In re claim 18, Li shows (fig. 1) a refractory metal liner (110, 120, 130a) comprising a barrier (TiN layer 120) comprising a passivating agent (nitrogen). The barrier impedes a subsequent reaction of a top half of the refractory metal liner with an adjacent conductive layer (103) (col. 5, lines 35-50). The barrier is limited to the central portion (layer 120) of the refractory metal.

In re claims 19-23, Li discloses (col. 5, lines 35-50) impurities from an adjacent conductive layer (130) are limited to the top half of the refractory metal liner. The barrier impedes impurities from diffusing from the adjacent conductive layer (103) through the refractory metal since TiN nitride naturally impedes silicon and fluorine. (Chen et al. [US 5,874,356] in col. 1, lines 47-57 states that TiN has barrier properties that protect

against the diffusion of silicon from the substrate and fluorine from subsequent tungsten deposition). A second conductive layer (130) is positioned over the refractory metal (110, 120, 130a). The barrier impedes impurities from diffusing from the second conductive layer and the impurities comprise fluorine (col. 5, lines 47-50).

In re claim 24, Li discloses that the refractory metal liner comprises titanium and the passivating agent comprises nitrogen (col. 5, lines 47-50 and col. 6, lines 23-31).

In re claim 25, Li shows (fig. 1) an electrical connection in an integrated circuit chip comprising a first conductive layer (103), and a liner (110, 120, 130a) on the first conductive layer. The liner includes a barrier (120) that impedes impurities from diffusing from the first conductive layer through the liner. A second conductive layer (130) is formed over the liner and the barrier also impedes second impurities from diffusing from the second conductive layer through the liner (col. 5, lines 35-50). The barrier is limited to the central portion (layer 120) of the refractory metal line wherein first impurities are positioned within the portion of the liner adjacent the first conductive layer and second impurities are positioned within the portion of the liner adjacent the second conductive layer.

In re claim 27, Li discloses that the refractory metal liner comprises titanium and the passivating agent comprises nitrogen (col. 5, lines 47-50 and col. 6, lines 23-31). The second conductive layer comprises tungsten.

In re claim 28, Li discloses that the impurities comprise fluorine (col. 5, lines 47-50).

In re claim 29, Li shows (fig. 1) an integrated circuit chip comprising a first conductive layer (103), and a liner (110, 120, 130a) on the first conductive layer. The liner includes a barrier (nitrogen) that impedes impurities from diffusing from the first conductive layer through the liner. A second conductive layer (130) is formed over the liner and also impedes impurities from diffusing from the second conductive layer through the liner (col. 5, lines 35-50). The barrier is limited to the central portion (layer 120) of the refractory metal line wherein first impurities are positioned within the portion of the liner adjacent the first conductive layer and second impurities are positioned within the portion of the liner adjacent the second conductive layer.

In re claim 31, Li discloses that the refractory metal liner comprises titanium and the passivating agent comprises nitrogen (col. 5, lines 47-50 and col. 6, lines 23-31). The second conductive layer comprises tungsten.

In re claim 32, Li discloses that the impurities comprise fluorine (col. 5, lines 47-50).

Allowable Subject Matter

Claims 26 and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments with respect to claims 18-32 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E Warren whose telephone number is (571) 272-1737. The examiner can normally be reached on Mon-Thur and alternating Fri 9:00-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tom Thomas

MEW
MEW
September 17, 2004

TOM THOMAS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800